CLAIMS

1. An electronic or optoelectronic device including a semiconductor material of a metal complex.

2. A device as claimed in claim 1, wherein the metal complex comprises a chain of cations and anions, wherein each anion and cation comprises a metal atom and the ions are bonded such that charge carriers of the metal atoms are delocalised along the chain.

3. A device as claimed in claim 2, wherein the ions are bonded to each other by means of the metal atoms.

4. A device as claimed in claim 2 or 3, wherein each ion comprises a metal atom and ligands linked to the metal atom.

5. A device as claimed in claim 4, wherein each ion is substantially planar.

6. A device as claimed in claim 4 or 5, wherein at least some of the ligands comprise a solubilizing moiety, preferably n alkyl chain.

7. A device as claimed in claim 6, wherein the alkyl chain is a branched alkyl chain.

8. A device as claimed in claim 7, wherein the alkyl chain is (S)-3,7-dimethyloctyl.

9. A device as claimed in any of claims 6 to 8, wherein at least some of the ligands are of the form NH_2R, where R is an alkyl chain.

10. A device as claimed in claim 9, wherein all of the ligands of the anions are of the form NH_2R.

11. A device as claimed in any of claims 4 to 10, wherein at least some of the ligands consist of halide atoms.

12. A device as claimed in claim 11, wherein the halide atoms are Cl.

13. A device as claimed in claim 11 or 12, wherein all of the ligands of the cations consist of halide atoms.

14. A device as claimed in any of claims 2 to 13, wherein all the anions are the same as each other and all the cations are the same as each other.

15. A device as claimed in of claims 2 to 14, wherein the length of the chain is in the range from 10 to 10,000 ions.

16. A device as claimed in any of claims 2 to 15, wherein each of the said metal atoms is independently one of Pt, Pd, Au, Ag, Ni, Cu.

17. A device as claimed in claim 16, wherein all the said metal atoms are Pt.

18. A device as claimed in any of claims 2 to 17, wherein at least some of the ligands comprise an optically active moiety.

19. A device as claimed in claim 18, wherein the optically active functional moiety is a fluorescent moiety or a phosphorescent moiety.

20. A device as claimed in any of claims 2 to 19, wherein at least some of the ligands comprise an electron donor moiety and at least some of the other ligands comprise an electron acceptor moiety and the said moieties are arranged to interact to form donor-acceptor complexes.

21. A device as claimed in claim 20, wherein the electron donor moieties are comprised by ligands of either the anions or cations and the electron acceptor moieties are comprised by the other of the anions and cations.

22. A device as claimed in any of claims 2 to 21, wherein at least some of the ligands comprise a charge transporting moiety.

23. A device as claimed in any preceding claim, wherein the said material is soluble.

24. A device as claimed in any preceding claim, wherein the semiconductor material constitutes an active semiconductor region of the device.

25. A device as claimed in any preceding claim, wherein the device is a switching device.

26. A device as claimed in any preceding claim, wherein the device is a transistor.

27. A device as claimed in any preceding claim, wherein the device is a field effect transistor.

28. A device as claimed in any of claims 1 to 24, wherein the device is a light-emitting device or a photodiode.

29. Use, as a semiconductor region of an electronic or optoelectronic device, of a metal complex.

30. Use, as a semiconductor region of an electronic or optoelectronic device, of a metal complex comprising a chain of cations and anions, wherein each anion and cation comprises a metal atom and the ions are bonded such that charge carriers of the metal atoms are delocalised along the chain.

31. A method of forming a semiconductor region of an electronic or optoelectronic device, the method comprising processing a metal complex from solution to form the said region.

32. A method of forming a semiconductor region of an electronic or optoelectronic device, the method comprising processing a metal complex from solution to form the said region, wherein said metal complex comprises a chain of cations and anions, wherein each anion and cation comprises a metal atom and the ions are bonded such that charge carriers of the metal atoms are delocalised along the chain.

33. A method of purifying a semiconductor material, the method comprising contacting the material with a solvent and thereby removing impurities from the material.

34. A method as claimed in claim 33, wherein the material is soluble.

35. A method as claimed in claim 34, wherein the material is insoluble in the solvent.

36. A method as claimed in any of claims 33 to 35, wherein the solvent is water.

37. A method as claimed in any of claims 33 to 36, wherein the material comprises a metal complex.

38. A method as claimed in claim 37, wherein the material comprises a chain of cations and anions, wherein each anion and cation comprises a metal atom and the ions are bonded such that charge carriers of the metal atoms are delocalised along the chain.

39. A method as claimed in any of claims 33 to 38, wherein prior to the said contacting step the semiconductor material is deposited on a substrate to form a semiconductor region and the semiconductor material is contacted with the solvent in situ on the substrate.

40. A method as claimed in claim 39, wherein the semiconductor region forms the active semiconductor region of an electronic or optoelectronic device.

41. A method as claimed in claim 40, comprising removing the solvent from the material and completing the formation of the electronic or electronic device.